

Claims

1. A battery, comprising:
 - a case;
 - a cell within the case, the cell comprising:
 - 5 a plurality of plates; and
 - a plurality of separators, the plates and separators being arranged so that for each pair of adjacent plates:
 - a first plate forms an anode plate and a second plate forms a cathode plate; and
 - 10 a separator is disposed between the anode plate and the cathode plate; and
 - a fibrous material within the case, at least some of the fibrous material being between the cell and the case.
- 15 2. The battery of claim 1, wherein the battery is a lead acid battery.
3. The battery of claim 2, further comprising sulfuric acid within the case.
4. The battery of claim 3, wherein a first portion of the sulfuric acid is adsorbed on
20 the fibrous material.
5. The battery of claim 4, wherein a second portion of the sulfuric acid is adsorbed in the separators.
- 25 6. The battery of claim 2, wherein the battery is a valve regulated lead acid battery.
7. The battery of claim 6, wherein the battery is an AGM-type valve regulated lead acid battery.
- 30 8. The battery of claim 6, wherein the battery is a flooded valve regulated lead acid battery.

9. The battery of claim 6, wherein the battery is a gel valve regulated lead acid battery.
10. The battery of claim 1, wherein the battery is a nickel metal hydride battery.
- 5 11. The battery of claim 10, wherein the fibrous material comprises a polymeric material.
12. The battery of claim 1, wherein the fibrous material comprises a siliceous
10 fibrous material.
13. The battery of claim 1, wherein the fibrous material comprises C glass.
14. The battery of claim 1, wherein the fibrous material comprises a polymeric
15 material.
15. The battery of claim 1, wherein the fibrous material comprises an inorganic material.
- 20 16. The battery of claim 1, wherein the fibrous material comprises an organic material.
17. The battery of claim 1, wherein a first portion of the fibrous material comprises an organic material and a second portion of the fibrous material comprises an inorganic
25 material.
18. The battery of claim 1, wherein at least one weight percent of the fibrous material passes through a 10x10 mesh during the shake test.
- 30 19. The battery of claim 1, wherein at least five weight percent of the fibrous material passes through a 8x8 mesh during the shake test.

20. The battery of claim 1, wherein at least five weight percent of the fibrous material passes through a 6x6 mesh during the shake test.

21. The battery of claim 1, wherein the fibrous material has an acid absorption of at least 50%.

22. The battery of claim 1, wherein the fibrous material is disposed in a gelling agent.

23. The battery of claim 1, wherein the particles of a material are mixed with the fibrous material.

24. The battery of claim 23, wherein the particles of the material comprise silica particles.

25. The battery of claim 1, wherein the fibrous material has an average length of from 0.1 millimeter to 1.5 millimeters.

26. The battery of claim 1, wherein the fibrous material has an average diameter of less than 40 microns.

27. The battery of claim 1, wherein the fibrous material has an average aspect ratio of less than 1,500.

28. The battery of claim 1, wherein the battery has a head space between the cell and the case, and a portion of the fibrous material is in the head space.

29. The battery of claim 1, wherein the battery has a fringe volume between the cell and the case, and a portion of the fibrous material is in the fringe volume.

30. The battery of claim 1, wherein at least some of the fibrous material is adsorbed in at least one of the separators.

31. The battery of claim 30, further comprising sulfuric acid adsorbed in the at least one of the separators.

32. The battery of claim 30, further comprising sulfuric acid adsorbed in the at least
5 one of the separators.

33. A process for manufacturing a battery having a case, the process comprising:
combining a fibrous material with an electrolyte; and
disposing the fibrous material and the electrolyte in the case of the battery.
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34. The process of claim 33, wherein the electrolyte comprises sulfuric acid.

35. The process of claim 33, wherein the electrolyte comprises potassium
hydroxide.
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36. The process of claim 33, wherein the fibrous material and the electrolyte form a
mixture before being disposed in the case, and the process further comprises filtering
the mixture to remove at least some of the fibrous material from the mixture before
disposing the fibrous material and the electrolyte in the case.
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37. The process of claim 33, wherein the electrolyte is disposed in the case before
the fibrous material is disposed in the case.

38. The process of claim 33, wherein the electrolyte is disposed in the case after the
25 fibrous material is disposed in the case.

39. The process of claim 33, wherein the case is substantially devoid of any
electrolyte before the electrolyte is disposed in the case.

30 40. The process of claim 33, wherein the battery comprises a cell within the case,
the cell comprising:

a plurality of plates; and
a plurality of separators,

wherein the plates and separators are arranged so that for each pair of adjacent plates:

a first plate forms an anode plate and a second plate forms a cathode plate; and

5 a separator is disposed between the anode plate and the cathode plate.

41. The process of claim 40, wherein the battery has a head space between the cell and the case, and at least a portion of the fibrous material is disposed within the head space.

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42. The process of claim 40, wherein the battery has a fringe volume between the cell and the case, and at least a portion of the fibrous material is disposed within the fringe volume.

15 43. The process of claim 40, wherein the cell is constructed before the fibrous material is disposed within the case.

44. The process of claim 40, wherein the cell is constructed before the electrolyte is disposed within the case.

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45. The process of claim 33, wherein the battery is a lead acid battery.

46. The process of claim 33, wherein the battery is a nickel metal hydride battery.

25 47. The process of claim 33, wherein the fibrous material comprises a siliceous material.

48. The process of claim 33, wherein the fibrous material has an average length of from 0.1 millimeter to 1.5 millimeters.

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49. The process of claim 33, wherein the fibrous material has an average diameter of less than 40 microns.

50. The process of claim 33, wherein the fibrous material has an average aspect ratio of less than 1,500.

51. A process for manufacturing a battery having a case, the process comprising:
5 constructing a cell in the case of the battery; and
after constructing the cell, disposing a fibrous filler in the case,
wherein the cell comprises:
a plurality of plates; and
a plurality of separators, the plates and separators being arranged so that
10 for each pair of adjacent plates:
a first plate forms an anode plate and a second plate forms a cathode
plate; and
a separator is disposed between the anode plate and the cathode plate.

15 52. The process of claim 51, further comprising disposing an electrolyte in the case.

53. The process of claim 52, wherein the electrolyte comprises sulfuric acid.

54. The process of claim 52, wherein the electrolyte comprises potassium
20 hydroxide.

55. The process of claim 52, wherein the electrolyte is disposed in the case before the fibrous material is disposed in the case.

25 56. The process of claim 52, wherein the electrolyte is disposed in the case after the fibrous material is disposed in the case.

57. The process of claim 52, wherein the case is substantially devoid of any electrolyte before the electrolyte is disposed in the case.

30 58. The process of claim 51, wherein the battery has a head space between the cell and the case, and at least a portion of the fibrous material is disposed within the head space.

59. The process of claim 51, wherein the battery has a fringe volume between the cell and the case, and at least a portion of the fibrous material is disposed within the fringe volume.

5 60. The process of claim 51, wherein the battery is a lead acid battery.

61. The process of claim 51, wherein the battery is a nickel metal hydride battery.

62. The process of claim 51, wherein the fibrous material comprises a siliceous
10 material.

63. The process of claim 51, wherein the fibrous material has an average length of from 0.1 millimeter to 1.5 millimeters.

15 64. The process of claim 51, wherein the fibrous material has an average diameter of less than 40 microns.

65. The process of claim 51, wherein the fibrous material has an average aspect ratio of less than 1,500.

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